

# IBM BladeCenter HS22V

## IBM Redbooks Product Guide

The IBM® BladeCenter® HS22V is a two-way high-performance blade server that offers outstanding performance for virtualization with new levels of memory capacity and CPU performance. It offers 18 DIMM slots supporting up to 288 GB of DDR3 memory for more and larger virtual machines per blade. HS22V supports durable solid-state drives and hardware RAID 0,1 providing outstanding reliability when virtualizing multiple workloads on a single blade. Combining the HS22V with Virtual Fabric from IBM BladeCenter provides flexible, easy, fast, and reliable I/O that supports up to 40 GbE to each blade and up to a total of eight ports of I/O per blade.

The HS22V is shown in Figure 1.

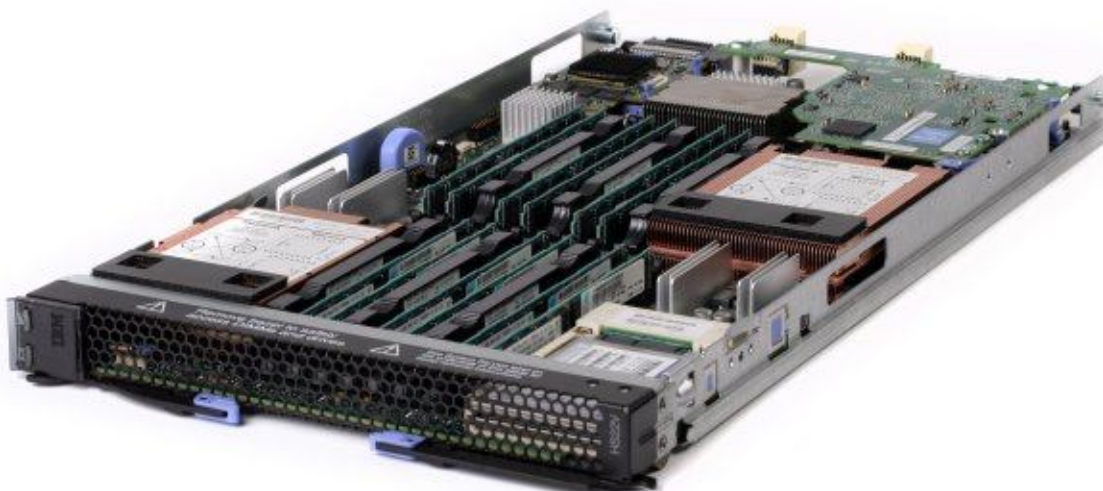


Figure 1. IBM BladeCenter HS22V

### Did you know?

BladeCenter HS22V delivered leadership performance for a 2-processor blade server running virtualization applications based on SPECvirt\_sc2010 benchmark. The HS22V achieved an overall performance score of 1,367 @ 84 VMs. The HS22V was configured with the Intel Xeon Processor X5690 (3.46GHz with 256KB L2 cache per core and 12MB L3 cache per processor—2 processors/12 cores/6 cores per chip), 288 GB of memory, two 50 GB disk drives, and Red Hat Enterprise Linux 6.0, and Kernel-based Virtual Machine (KVM) hypervisor.

## Locations of key components and connectors

Figure 2 shows the inside of the server indicating key components.

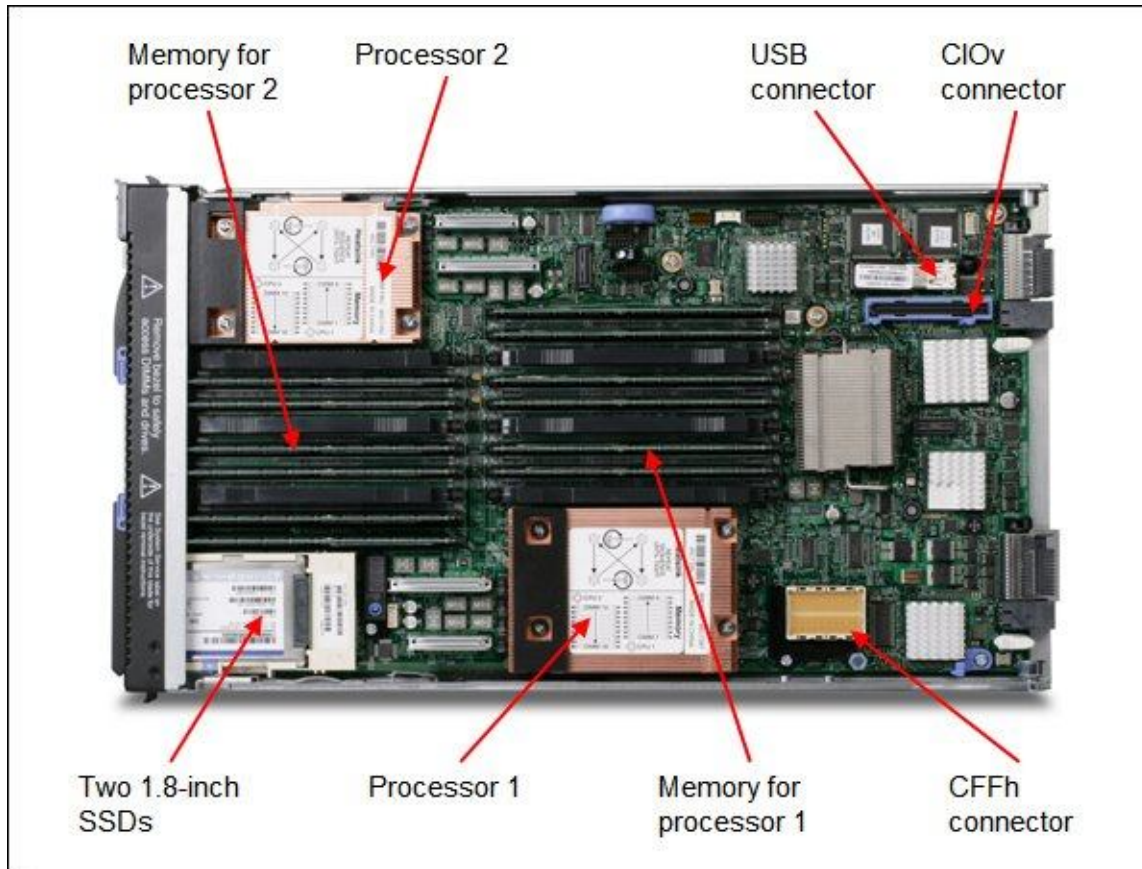


Figure 2. IBM BladeCenter HS22V

## Standard specifications

The following table lists the standard specifications.

Table 1. Standard specifications

Components	Specification
Form factor	Single-wide (30 mm)
Processor (max)	Intel Xeon 5500 series processors Intel Xeon 5600 series processors
Number of processors	1 standard / 2 maximum
Memory DIMM sockets	18x DDR-3 VLP DIMM slots
Maximum memory	Models with Xeon 5600 processors: 288 GB using 16 GB DIMMs (144 GB per processor) Models with Xeon 5500 processors: 144 GB using 8 GB DIMMs (72 GB per processor)
Expansion slots	One CIOv slot: 2 ports One CFFh slot: 4 ports
Disk bays	Two non-hot-swap bays supporting two solid-state drives
Maximum internal storage	Up to 100 GB total internal storage
Network interface	2x 1Gb Ethernet using a Broadcom 5709S onboard NIC Some models also include a 2-port 10Gb controller installed in the CFFh slot Some models also include a 2-port 8Gb Fibre Channel controller installed in the CIOv slot
Hot-swap components	None
RAID support	RAID-0, -1 and -1E (optional RAID-5 with battery-backed cache)
Systems management	Unified Extensible Firmware Interface (UEFI), IBM Integrated Management Module (IMM), Predictive Failure Analysis, optional embedded hypervisor for virtualization, IBM Systems Director Active Energy Manager™, light path diagnostics, IBM Systems Director, and IBM ServerGuide
Security	Trusted Platform Module (TPM), Power-on password, administrator password, unattended boot, selectable boot, unattended start mode
Operating systems supported	Microsoft Windows, Red Hat Enterprise Linux, SUSE Linux Enterprise, VMware, Oracle Solaris
Limited warranty	Three-year customer replaceable unit, and onsite and offsite limited warranty

The IBM BladeCenter HS22V is shipped with the following items:

- Documentation CD
- Environmental Notices CD
- Statement of Limited Warranty
- Important Notices
- Technical Note Flyer

## Standard models

The following table lists the standard models.

Table 2. Standard models

Model	Processor** (2 max)	Memory (std / max)	Eth†	RAID	Bays (used/max)	Disk drives	Slots (used/max)
Models with Intel Xeon 5500 Series Processors: 4-core and 2-core							
7871-B4x*	1x Xeon E5540 4C 2.53GHz 8MB 1066MHz 80w	3x 2GB / 144 GB	2x 1Gb	SAS RAID	0 / 2	Open	0 / 2
7871-C4x*	1x Xeon X5570 4C 2.93GHz 8MB 1333MHz 95w	3x 2GB / 144 GB	2x 1Gb	SAS RAID	0 / 2	Open	0 / 2
Models with Intel Xeon 5600 Series Processors: 4-core							
7871-A5x*	1x Xeon E5603 4C 1.60GHz 4MB 1066MHz 80w	1x 4GB / 288 GB	2x 1Gb	SAS RAID	0 / 2	Open	0 / 2
7871-A7x*	1x Xeon E5607 4C 2.26GHz 8MB 1066MHz 80w	1x 4GB / 288 GB	2x 1Gb	SAS RAID	0 / 2	Open	0 / 2
7871-G2x	1x Xeon E5620 4C 2.40GHz 12MB 1066MHz 80w	3x 2GB / 288 GB	2x 1Gb	SAS RAID	0 / 2	Open	0 / 2
7871-B5x*	1x Xeon X5647 4C 2.93GHz 12MB 1066MHz 130w	3x 4GB / 288 GB	2x 1Gb	SAS RAID	0 / 2	Open	0 / 2
7871-H5x*	1x Xeon X5667 4C 3.06GHz 12MB 1333MHz 95w	3x 2GB / 288 GB	2x 1Gb	SAS RAID	0 / 2	Open	0 / 2
7871-C5x*	1x Xeon X5672 4C 3.20GHz 12MB 1333MHz 95w	3x 4GB / 288 GB	2x 1Gb	SAS RAID	0 / 2	Open	0 / 2
7871-C7x*	1x Xeon X5687 4C 3.60GHz 12MB 1333MHz 130w	3x 4GB / 288 GB	2x 1Gb	SAS RAID	0 / 2	Open	0 / 2
Models with Intel Xeon 5600 Series Processors: 6-core							
7871-N2x*	1x Xeon L5640 6C 2.26GHz 12MB 1333MHz 60w	3x 2GB / 288 GB	2x 1Gb	SAS RAID	0 / 2	Open	0 / 2
7871-B6x*	1x Xeon E5649 6C 2.53GHz 12MB 1333MHz 80w	3x 4GB / 288 GB	2x 1Gb	SAS RAID	0 / 2	Open	0 / 2
7871-D4x*	1x Xeon E5649 6C 2.53GHz 12MB 1333MHz 80W	3x 4 GB / 288 GB	2x 1 Gb	SAS RAID	0 / 2	Open	0 / 2
7871-H2x*	1x Xeon X5650 6C 2.66GHz 12MB 1333MHz 95w	3x 2GB / 288 GB	2x 1Gb	SAS RAID	0 / 2	Open	0 / 2
7871-HXx*	2x Xeon X5660 6C 2.8GHz 12MB 1333MHz 95w	18x 4GB / 288 GB	2x 1Gb + 2x 10Gb + 2x 8Gb FC	SAS RAID	0 / 2	Open	2 / 2
7871-C6x*	1x Xeon X5675 6C 3.06GHz 12MB 1333MHz 95w	3x 4GB / 288 GB	2x 1Gb	SAS RAID	0 / 2	Open	0 / 2
7871-C8x*	1x Xeon X5690 6C 3.46GHz 12MB 1333MHz 130w	3x 4GB / 288 GB	2x 1Gb	SAS RAID	0 / 2	Open	0 / 2

\* Withdrawn from marketing

\*\* Processor detail: (model, cores, core speed, L3 cache, memory speed, power)

† All models contain an onboard 2-port Gigabit Ethernet controller. Model HXx also includes Broadcom 10Gb Gen2 2-port Ethernet Expansion Card (CFFh) installed in the CFFh expansion slot and Qlogic 8Gb Fibre Channel Expansion Card (CIOv) installed in the CIOv expansion slot.

Three models have an additional 2-port 10Gb Ethernet controller installed in the CFFh slot, and one also has a Fibre Channel card installed:

- Model GDx includes an Intel 10Gb 2-port Ethernet Expansion Card (CFFh)
- Model HAx includes an Emulex 10Gb Virtual Fabric Adapter (CFFh)
- Model HXx includes a Broadcom 10Gb Gen2 2-port Ethernet Expansion Card (CFFh) and a Qlogic 8Gb Fibre Channel Expansion Card (CIOv).

Refer to the Standard Specifications section for information about standard features of the server.

## Chassis support

The HS22V is supported in the various BladeCenter chassis as listed in the following table.

Table 4. Chassis support

Description	BC-E (8677)	BC-T	BC-S (8886)	BC-H (8852)	BC-HT AC (8750)	BC-HT DC (8740)
HS22V with 130W CPUs	No	No	Some limits*	Some limits*	Some limits*	No
HS22V with up to 95W CPUs	Some limits*	No	Full	Full	Full	Full

\* See Table 4 for details

The number of HS22V servers supported in each chassis depends on the thermal design power of the processors used in the servers as shown in Table 6. The table uses the following conventions:

- A green square in a cell means the chassis can be filled with HS22V blade servers up to the maximum number of blade bays in the chassis (for example, 14 blades in the BladeCenter H).
- A yellow square in a cell means that the maximum number of HS22V blades that the chassis can hold is fewer than the total available blade bays (for example, 12 in a BladeCenter H). Other bays in the chassis *may* or *may not* be occupied by servers other than HS22 and HS22V depending on the combination and some bays must remain empty. Consult the BladeCenter Interoperability Guide for specifics: <http://ibm.com/support/entry/portal/docdisplay?lnocid=MIGR-5073016>

**Note:** The HS22V is not supported in the BladeCenter E with power supplies smaller than 2000 W.

Table 5. Chassis support (detailed)

CPU TDP*	Maximum number of HS22V servers supported in each chassis									
	BC-E with AMM (8677) (14 bays)		BC-S (8886) (6 bays)	BC-H (models other than 4Tx) (14 bays)				BC-H (-4Tx) (14 bays)	BC-HT AC (8750) (12 bays)	BC-HT DC (8740) (12 bays)
	2000 W power supplies	2320 W power supplies		2900W supplies		2980W supplies**		2980W		
				Standard blowers	Enhanced blowers†	Standard blowers	Enhanced blowers†	Enhanced blowers†		
130W	None‡	None‡	5	None‡	12	None‡	14	14	10	None‡
95W	11	14	6	14	14	14	14	14	12	None‡
80W	12	14	6	14	14	14	14	14	12	None‡
60W	13	14	6	14	14	14	14	14	12	None‡
40W	14	14	6	14	14	14	14	14	12	None‡

\* Thermal Design Power

\*\* IBM BladeCenter H 2980W AC Power Modules, 68Y6601 (standard in 4Tx, optional with all other BC-H chassis models)

† IBM BladeCenter H Enhanced Cooling Modules, 68Y6650 (standard in 4Tx, optional with all other BC-H chassis models)

‡ Not supported

## Processor options

The HS22V supports the processor options listed in the following table. The server supports one or two processors. The table also shows which server models have each processor standard. If there is no corresponding *where-used* model for a particular processor, then this processor is only available through Configure to Order (CTO).

Table 6. Processor options (Part 1)

Part number	Intel Xeon processor description	Models where used
Intel Xeon 5600 Series Processors: 4-core		
81Y6038	Xeon E5603 4C 1.60GHz 4MB 1066MHz 80w	A5x
81Y6039	Xeon E5606 4C 2.13GHz 8MB 1066MHz 80w	-
81Y6040	Xeon E5607 4C 2.26GHz 8MB 1066MHz 80w	A7x
69Y0927	Xeon E5620 4C 2.40GHz 12MB 1066MHz 80w	G2x
69Y0926	Xeon E5630 4C 2.53GHz 12MB 1066MHz 80w	-
69Y4746	Xeon L5609 4C 1.86GHz 12MB 1066MHz 40w	-
69Y4743	Xeon L5618 4C 1.86GHz 12MB 1066MHz 40w	-
81Y6041	Xeon X5647 4C 2.93GHz 12MB 1066MHz 130w	B5x
81Y6043	Xeon X5672 4C 3.20GHz 12MB 1333MHz 95w	C5x
81Y6045	Xeon X5687 4C 3.60GHz 12MB 1333MHz 130w	C7x

Table 6. Processor options (Part 2)

Part number	Intel Xeon processor description	Models where used
Intel Xeon 5600 Series Processors: 6-core		
69Y4744	Xeon E5645 6C 2.40GHz 12MB 1333MHz 80w	-
81Y6042	Xeon E5649 6C 2.53GHz 12MB 1333MHz 80w	B6x
69Y4745	Xeon L5638 6C 2.0GHz 12MB 1333MHz 60w	-
69Y0928	Xeon L5640 6C 2.26GHz 12M 1333MHz 60w	N2x
69Y0924	Xeon X5650 6C 2.66GHz 12M 1333MHz 95w	H2x, HAx
69Y0923	Xeon X5660 6C 2.80GHz 12MB 1333MHz 95w	HXx
69Y0922	Xeon X5670 6C 2.93GHz 12MB 1333MHz 95w	H4x
81Y6044	Xeon X5675 6C 3.06GHz 12MB 1333MHz 95w	C6x
69Y4748	Xeon X5680 6C 3.33GHz 12MB 1333MHz 130w	F2x
81Y6046	Xeon X5690 6C 3.46GHz 12MB 1333MHz 130w	C8x
Intel Xeon 5500 Series Processors: 4-core		
49Y5151	Xeon E5506 4C 2.13GHz 4MB 800MHz 80w	-
49Y5163	Xeon E5540 4C 2.53GHz 8MB 1066MHz 80w	B4x
49Y5172	Xeon X5570 4C 2.93GHz 8MB 1333MHz 95w	C4x

## Memory options

IBM DDR3 memory is compatibility tested and tuned for optimal System x performance and throughput. IBM memory specifications are integrated into the light path diagnostics for immediate system performance feedback and optimum system uptime. From a service and support standpoint, IBM memory automatically assumes the IBM system warranty, and IBM provides service and support worldwide.

The HS22V blade server has 18 DIMM slots. When one processor is installed, then only nine DIMM slots can be used. When two processors are installed, then all 18 DIMM slots can be used. However, the maximum amount of DIMMs that can be installed is also limited by the type and rank of DIMM used, as follows:

- Up to 18 single-rank RDIMMs (nine per processor) for a maximum of 72 GB (18x 4 GB)
- Up to 18 dual-rank RDIMMs (nine per processor) for a maximum of 288 GB (18x 16 GB) for Xeon 5600 series and 144 GB (18x 8 GB) for Xeon 5500 series

Each CPU has three memory channels, and there are three DIMMs per channel. RDIMMs can be populated three per channel. Maximum memory speed is limited by memory speed supported by the specific CPU (that is, if the CPU supports only 1066 MHz, then the memory speed cannot exceed 1066 MHz in any case), and by the number and type of DIMMs installed (whatever is lower), as follows:

- Intel Xeon 5600 series processors:
  - 1333 MHz when one or two single-rank or dual-rank RDIMMs per channel are installed
  - 800 MHz when three single-rank or dual-rank RDIMMs per channel are installed

- Quad-core Intel Xeon 5500 series processors:
  - 1333 MHz when one single-rank or dual-rank RDIMM per channel is installed
  - 1066 MHz when two single-rank or dual-rank RDIMMs per channel are installed
  - 800 MHz when three single-rank or dual-rank RDIMMs per channel are installed
- Dual-core Intel Xeon 5500 series processors only support memory speed at 800 MHz.

The HS22V supports both 1.5 V and 1.35 V DIMMs. Intel Xeon 5600 series processor can run DIMMs at either 1.35 V or 1.5 V depending on DIMM voltage and configuration, while Intel Xeon 5500 series processors run DIMMs at 1.5 V in all cases. Mixing 1.5 V and 1.35 V DIMMs in the same server is supported, in such a case all DIMMs operate at 1.5 V. With 1.35V DIMMs if there is a need to run two DIMMs per channel at 1333 MHz then DIMMs will operate at 1.5 V.

The following memory protection technologies are supported:

- ECC
- ChipKill (for x4-based RDIMMs)
- Memory Mirroring
- Memory Sparing

If Memory Mirroring is used then DIMMs must be installed in pairs (minimum of one pair per each CPU), and both DIMMs in a pair must be identical in type and size. If Memory Sparing is used then DIMMs must be installed in sets of three, and all DIMMs in the same set must be identical in type and size. Memory sparing is only supported for Intel Xeon 5600 series processor-based systems.

The following two tables list memory options available for HS22V server - one of 5500 series processors and one for 5600 series processors. DIMMs can be installed one at a time, but for performance reasons, install them in sets of three, one for each of the three memory channels.

Table 7. Memory options for servers with Xeon 5500 series processors

Part number	Description	Maximum quantity supported	Models where used
49Y1427	1 GB (1x 1 GB, 1Rx8, 1.5 V) PC3-10600 CL9 ECC DDR3 1333 MHz	18	-
49Y1428	2 GB (1x 2 GB, 2Rx8, 1.5 V) PC3-10600 CL9 ECC DDR3 1333 MHz	18	-
49Y1429	2 GB (1x 2 GB, 1Rx4, 1.5 V) PC3-10600 CL9 ECC DDR3 1333 MHz	18	-
44T1594	2 GB (1x 2 GB, 1Rx8, 1.5 V) PC3-10600 CL9 ECC DDR3 1333 MHz	18	-
46C0560	2 GB (1x 2 GB, 1Rx8, 1.35 V) PC3L-10600 CL9 ECC DDR3 1333 MHz	18	-
49Y1430	4 GB (1x 4 GB, 2Rx4, 1.5 V) PC3-10600 CL9 ECC DDR3 1333 MHz	18	-
44T1596	4 GB (1x 4 GB, 2Rx8, 1.5 V) PC3-10600 CL9 ECC DDR3 1333 MHz	18	-
46C0563	4 GB (1x 4 GB, 1Rx4, 1.35 V) PC3L-10600 CL9 ECC DDR3 1333 MHz	18	-
46C0564	4 GB (1x 4 GB, 2Rx8, 1.35 V) PC3L-10600 CL9 ECC DDR3 1333 MHz	18	-
46C0568	8 GB (1x 8 GB, 2Rx4, 1.35 V) PC3L-10600 CL9 ECC DDR3 1333 MHz	18	-
49Y1431	8 GB (1x 8 GB, 2Rx4, 1.5 V) PC3-10600 CL9 ECC DDR3 1333 MHz	18	-



Table 8. Memory options for servers with Xeon 5600 series processors

Part number	Description	Maximum quantity supported	Models where used
Standard DIMMs (1.5 V)			
49Y1427	1 GB (1x 1 GB, 1Rx8, 1.5 V) PC3-10600 CL9 ECC DDR3 1333 MHz	18	-
49Y1428	2 GB (1x 2 GB, 2Rx8, 1.5 V) PC3-10600 CL9 ECC DDR3 1333 MHz	18	F2x, F3x, G2x, G4x, GDx, H2x, H4x, H5x, HAx, N2x
49Y1429	2GB (1x 2GB, 1Rx4, 1.5V) PC3-10600 CL9 ECC DDR3 1333 MHz	18	-
44T1594	2GB (1x 2GB, 1Rx8, 1.5V) PC3-10600 CL9 ECC DDR3 1333 MHz	18	-
44T1596	4 GB (1x 4 GB, 2Rx8, 1.5 V) PC3-10600 CL9 ECC DDR3 1333 MHz	18	-
49Y1430	4GB (1x 4GB, 2Rx4, 1.5 V) PC3-10600 CL9 ECC DDR3 1333 MHz	18	HXx
49Y1431	8GB (1x 8GB, 2Rx4, 1.5V) PC3-10600 CL9 ECC DDR3 1333 MHz	18	-
Low Power DIMMs (1.35 V)			
46C0560	2GB (1x 2GB, 1Rx8, 1.35V) PC3L-10600 CL9 ECC DDR3 1333 MHz	18	-
46C0563	4GB (1x 4GB, 1Rx4, 1.35V) PC3L-10600 CL9 ECC DDR3 1333 MHz	18	A5x, A7x, B5x, B6x, C5x, C6x, C7x, C8x
46C0564	4GB (1x 4GB, 2Rx8, 1.35V) PC3L-10600 CL9 ECC DDR3 1333 MHz	18	-
46C0568	8GB (1x 8GB, 2Rx4, 1.35V) PC3-10600 CL9 ECC DDR3 1333 MHz	18	-
46C0599	16GB (1x16 GB, 2Rx4, 1.35V) PC3L-10600 CL9 ECC DDR3 1333 MHz	18	-

## Internal disk storage options

The HS22V blade server features an onboard LSI Logic 53C1064E SAS controller that connect to two SAS ports at the front of the HS22V motherboard. The LSI Logic 53C1064E SAS controller provides RAID 0 or RAID 1 capability and supports up to two internal non-hot-swap 1.8-inch solid state drives (SSDs).

The following table lists the solid state drive options available for internal storage.

Table 9. SSD options for internal disk storage

Part number	Feature code	Description	Maximum supported
Enterprise SSDs			
49Y6124	A3AP	IBM 400GB SATA 1.8" MLC Enterprise SSD	2
49Y6119	A3AN	IBM 200GB SATA 1.8" MLC Enterprise SSD	2
00W1120	A3HQ	IBM 100GB SATA 1.8" MLC Enterprise SSD	2
43W7746	5420	IBM 200GB SATA 1.8" MLC SSD	2
43W7726	5428	IBM 50GB SATA 1.8" MLC SSD	2
Enterprise Value SSDs			
49Y5993	A3AR	IBM 512GB SATA 1.8" MLC Enterprise Value SSD	2
00W1227	A3TH	IBM 256GB SATA 1.8" MLC Enterprise Value SSD	2
00W1222	A3TG	IBM 128GB SATA 1.8" MLC Enterprise Value SSD	2
49Y5834	A3AQ	IBM 64GB SATA 1.8" MLC Enterprise Value SSD	2

## Internal backup units

The server does not support an internal tape drive option.

## Optical drives

The server does not support an optical drive option, however it does interface to the optical drive installed in the BladeCenter chassis media tray if one is installed there.

## I/O expansion options

The HS22V server offers the following PCI Express 2.0 slots. Neither are hot-swap.

- CIOv expansion slot
- CFFh expansion slot

The CIOv I/O expansion connector provides I/O connections through the midplane of the chassis to modules located in bays 3 and 4 of a supported BladeCenter chassis. It is a PCIe 2.0 x8 slot.

The CFFh I/O expansion connector provides I/O connections to high-speed switch modules that are located in bays 7, 8, 9, and 10 of a BladeCenter H or BladeCenter HT chassis, or to switch bay 2 in a BladeCenter S chassis. The CFFh slot is a PCIe x16 slot.

The HS22V optionally supports the IBM BladeCenter PCI Express I/O Expansion Unit (PCI Express Gen 1). The expansion blade provides the capability to attach selected PCI Express cards to the HS22V. This capability is ideal for many applications that require special telecommunications network interfaces or hardware acceleration using a PCI Express card.

The IBM BladeCenter PCI Express I/O Expansion Unit has two standard full-length PCI Express slots that support the attachment of two full sized, 25 W PCI Express adapters. These two slots are PCI Express x16 slots mechanically, however they can operate only at speeds up to x8. The unit provides two power connectors that can be used to provide 12V, with a cable, to PCI Express adapters that have external power connectors. One expansion blade can be attached to an HS22V. Each expansion blade occupies a bay in the BladeCenter chassis. See the following table.

Table 10. Expansion blades

Part number	Description	Maximum quantity supported
43W4391	IBM BladeCenter PCI Express I/O Expansion Unit	1

## Network adapters

The HS22V offers two integrated Gigabit Ethernet ports, based on the Broadcom BCM5709S controller.

- Failover, adapter fault tolerance
- PXE 2.0 Boot Agent
- Wake on LAN
- Load balancing or teaming

The following table lists additional supported network adapters.

Table 11. Network adapters

Part number	Feature code	Description	Slots supported
10 Gb Ethernet			
46M6164	0098	Broadcom 10Gb Gen2 4-port Ethernet Exp Cd (CFFh) for IBM BladeCenter	CFFh
81Y3133	A1QR	Broadcom 2-port 10Gb Virtual Fabric Adapter for IBM BladeCenter	CFFh
81Y1650	5437	Brocade 2 port 10GbE Converged Network Adapter for IBM BladeCenter	CFFh
00Y3264	A3NW	Emulex 10GbE Virtual Fabric Adapter Advanced II - IBM BladeCenter	CFFh
90Y3566	A1XH	Emulex 10GbE Virtual Fabric Adapter Advanced II - IBM BladeCenter	CFFh
00Y3266	A3NV	Emulex 10GbE Virtual Fabric Adapter II - IBM BladeCenter	CFFh
90Y3550	A1XG	Emulex 10GbE Virtual Fabric Adapter II - IBM BladeCenter	CFFh
49Y4265	2436	Emulex 10Gb Virtual Fabric Advanced Upgrade for IBM BladeCenter (license only)	None
42C1810	3593	Intel 10Gb 2-port Ethernet Expansion Card (CFFh) for IBM BladeCenter	CFFh
90Y3570	A1NW	Mellanox 2-port 10Gb Enet Expansion Card (CFFh) - IBM BladeCenter	CFFh
00Y3280	A3JB	QLogic 2-port 10Gb CNA (CFFh) for IBM BladeCenter	CFFh
42C1830	3592	QLogic 2-pt 10Gb Converged Network Adapter(CFFh) for IBM BladeCenter	CFFh
1 Gb Ethernet			
44W4479	5476	2/4 Port Ethernet Expansion Card (CFFh) for IBM BladeCenter	CFFh
44W4475	5477	Ethernet Expansion Card (CIOv) for IBM BladeCenter	CIOv
00Y3270	A3JC	QLogic Enet and 8Gb FC Exp Card (CFFh) for IBM BladeCenter	CFFh
44X1940	5485	QLogic Eth and 8Gb Fibre Channel Exp Card (CFFh) for IBM BladeCenter	CFFh
InfiniBand			
46M6001	0056	2-port 40Gb Infiniband Expansion Card (CFFh) for IBM BladeCenter	CFFh
43W4423	2991	4X InfiniBand DDR Expansion Card (CFFh) for IBM BladeCenter	CFFh
43W4420	2993	Voltaire 4X InfiniBand DDR Expansion Card (CFFh) for IBM BladeCenter	CFFh

## Storage host bus adapters

The following table lists storage HBAs supported by HS22V server.

Table 12. Storage adapters

Part number	Description	Slots supported	Maximum supported
Combination Ethernet and Fibre Channel			
44X1940	QLogic Eth and 8Gb Fibre Channel Exp Card (CFFh)	CFFh	1
Fibre Channel			
46M6140	Emulex 8Gb Fibre Channel Expansion Card (CIOv) for IBM BladeCenter	CIOv	1
46M6065	QLogic 4Gb Fibre Channel Expansion Card (CIOv) for IBM BladeCenter	CIOv	1
44X1945	QLogic 8Gb Fibre Channel Expansion Card (CIOv) for IBM BladeCenter*	CIOv	1
SAS			
46C7167	ServeRAID-MR10ie (CIOv) Controller for IBM BladeCenter	CIOv	1
43W4068	SAS Connectivity Card (CIOv)	CIOv	1
HBAs in the IBM BladeCenter PCI Express I/O Expansion Unit			
39R6527	QLogic 4Gb FC Dual-Port PCIe HBA for IBM System x	PCI-E	2
39R6525	QLogic 4Gb FC Single-Port PCIe HBA for IBM System x	PCI-E	2

\* The QLogic 8Gb Fibre Channel Expansion Card (CIOv) is standard in model HXx as listed in Table 2

## PCIe SSD adapters

The HS22V server supports the High IOPS SSD adapters listed in the following table. The adapters must be installed in an IBM BladeCenter PCI Express I/O Expansion Unit.

Table 13. SSD adapters

Part number	Description	Slots supported	Max quantity
46M0878	IBM 320GB High IOPS SD Class SSD PCIe Adapter	PCI Express I/O Expansion Unit (43W4391)	2
46M0877	IBM 160GB High IOPS SS Class SSD PCIe Adapter	PCI Express I/O Expansion Unit (43W4391)	2

For information about these adapters, see the *IBM High IOPS SSD PCIe Adapters at-a-glance guide*: <http://www.redbooks.ibm.com/abstracts/tips0729.html?Open>

## Power supplies

Server power is derived from the power supplies installed in the BladeCenter chassis. There are no server options regarding power supplies.

## Integrated virtualization

The server supports VMware ESXi installed on a USB memory key. The key is installed in a USB socket inside the server. The following table lists the virtualization options.

Table 14. Virtualization options

Part number	Feature code	Description	Maximum supported
41Y8298	A2G0	IBM Blank USB Memory Key for VMware ESXi Downloads	1
41Y8283	1749	IBM USB Memory Key for VMware ESXi 3.5 Update 5	1
41Y8278	1776	IBM USB Memory Key for VMware ESXi 4	1
41Y8287	3033	IBM USB Memory Key for VMware ESXi 4.1	1
41Y8296	A1NP	IBM USB Memory Key for VMware ESXi 4.1 Update 1	1
41Y8300	A2VC	IBM USB Memory Key for VMware ESXi 5.0	1
41Y8307	A383	IBM USB Memory Key for VMware ESXi 5.0 Update1	1
41Y8311	A2R3	IBM USB Memory Key for VMware ESXi 5.1	1

## Remote management

The server contains an IBM Integrated Management Module (IMM) which interfaces with the advanced management module in the BladeCenter chassis. The combination of these two provides advanced service-processor control, monitoring, and an alerting function. If an environmental condition exceeds a threshold or if a system component fails, LEDs on the system board are lit to help you diagnose the problem, records the error in the event log, and alerts you to the problem. A virtual presence capability is also available for remote server management capabilities.

Remote server management is provided through industry-standard interfaces:

- Intelligent Platform Management Interface (IPMI) Version 2.0
- Simple Network Management Protocol (SNMP) Version 3
- Common Information Model (CIM)
- Web browser

The server also supports virtual media and remote control features which provide the following functions:

- Remotely viewing video with graphics resolutions up to 1600x1200 at 75 Hz, regardless of the system state
- Remotely accessing the server using the keyboard and mouse from a remote client
- Mapping the CD or DVD drive, diskette drive, and USB flash drive on a remote client, and mapping ISO and diskette image files as virtual drives that are available for use by the server
- Uploading a diskette image to the IMM memory and mapping it to the server as a virtual drive
- Capture blue-screen errors

## Supported operating systems

The server supports the following operating systems:

- Microsoft Windows Essential Business Server 2008 Premium Edition
- Microsoft Windows Essential Business Server 2008 Standard Edition
- Microsoft Windows Server 2008 HPC Edition
- Microsoft Windows Server 2008 R2
- Microsoft Windows Server 2008, Datacenter x64 Edition
- Microsoft Windows Server 2008, Datacenter x86 Edition
- Microsoft Windows Server 2008, Enterprise x64 Edition
- Microsoft Windows Server 2008, Enterprise x86 Edition
- Microsoft Windows Server 2008, Standard x64 Edition
- Microsoft Windows Server 2008, Standard x86 Edition
- Microsoft Windows Server 2008, Web x64 Edition
- Microsoft Windows Server 2008, Web x86 Edition
- Microsoft Windows Server 2012
- Microsoft Windows Small Business Server 2008 Premium Edition
- Microsoft Windows Small Business Server 2008 Standard Edition
- Red Hat Enterprise Linux 4 AS for AMD64/EM64T
- Red Hat Enterprise Linux 4 ES for AMD64/EM64T
- Red Hat Enterprise Linux 4 WS/HPC for AMD64/EM64T
- Red Hat Enterprise Linux 5 Server Edition with Xen
- Red Hat Enterprise Linux 5 Server with Xen x64 Edition
- Red Hat Enterprise Linux 5 Server x64 Edition
- Red Hat Enterprise Linux 6 Server x64 Edition
- Red Hat Enterprise MRG 1.0 Realtime (x64)
- Red Hat Enterprise MRG 2.0 Realtime (x64)
- Solaris 10 Operating System
- SUSE LINUX Enterprise Real Time 10 AMD64/EM64T
- SUSE LINUX Enterprise Real Time 11 AMD64/EM64T
- SUSE LINUX Enterprise Server 10 for AMD64/EM64T
- SUSE LINUX Enterprise Server 10 with Xen for AMD64/EM64T
- SUSE LINUX Enterprise Server 10 with Xen for x86
- SUSE LINUX Enterprise Server 11 for AMD64/EM64T
- SUSE LINUX Enterprise Server 11 for x86
- SUSE LINUX Enterprise Server 11 with Xen for AMD64/EM64T
- VMware ESX 3.5
- VMware ESX 4.0
- VMware ESX 4.1
- VMware ESXi 3.5
- VMware ESXi 4.0
- VMware ESXi 4.1
- VMware vSphere 5.0 (ESXi)
- VMware vSphere 5.1 (ESXi)

See the IBM ServerProven® website for the latest information about the specific versions and service levels supported and any other prerequisites:

<http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/nos/matrix.shtml>



## Physical specifications

### Dimensions:

- Height: 245 mm (9.7 in)
- Depth: 446 mm (17.6 in)
- Width: 29 mm (1.14 in)

Maximum weight: 4.8 kg (10 lb)

### Operating environment

- Temperature: 5 to 40° C (41 to 104° F) to 914 m
- Relative humidity: 8 to 80% (noncondensing)

### NEBS environment:

- Air temperature:
  - Chassis on (short term\*): -5 to 55° C (23 to 131° F) Altitude: -60 m (-197 ft) to 1,800 m (6,000 ft)
  - Chassis on: 5 to 30° C (41 to 86° F) Altitude: 1,800 m (600 ft) to 4,000 m (13,000 ft)
  - Chassis on (short term\*): -5 to 45° C (23 to 113° F) Altitude: 1,800 m (6,000 ft) to 4,000 m (13,000 ft)
  - Chassis off: -40 to 70° C (-40 to 158° F)
- Rate of temperature change 30° C/hr (54° F/hr)
- Humidity:
  - Chassis on: 5% to 85%
  - Chassis on (short term\*): 5% to 90% but not to exceed 0.024 kg water/kg of dry air
  - Chassis off: uncontrolled

\* Short term is defined as a period of not more than 96 consecutive hours and a total of not more than 15 days in one year. (A total of 360 hours in any given year, but, no more than 15 occurrences during that one-year period.)

## Warranty options

The BladeCenter HS22V has a 3-year onsite warranty with 9x5/next business day terms. IBM offers the warranty service upgrades through IBM ServicePac®, discussed in this section. The IBM ServicePac is a series of prepackaged warranty maintenance upgrades and post-warranty maintenance agreements with a well-defined scope of services, including service hours, response time, term of service, and service agreement terms and conditions.

IBM ServicePac offerings are country-specific, that is, each country might have its own service types, service levels, response times, and terms and conditions. Not all covered types of ServicePacs might be available in a particular country. For more information about IBM ServicePac offerings available in your country visit the IBM ServicePac Product Selector at <https://www-304.ibm.com/sales/gss/download/spst/servicepac>.

The following table explains warranty service definitions in more detail.

Table 15. Warranty service definitions

Term	Description
IBM onsite repair (IOR)	A service technician will come to the server's location for equipment repair.
24x7x2 hour	A service technician is scheduled to arrive at your customer's location within two hours after remote problem determination is completed. We provide service around the clock, every day, including IBM holidays.
24x7x4 hour	A service technician is scheduled to arrive at your customer's location within four hours after remote problem determination is completed. We provide service around the clock, every day, including IBM holidays.
9x5x4 hour	A service technician is scheduled to arrive at your customer's location within four business hours after remote problem determination is completed. We provide service from 8:00 a.m. to 5:00 p.m. in the customer's local time zone, Monday through Friday, excluding IBM holidays. If after 1:00 p.m. it is determined that onsite service is required, the customer can expect the service technician to arrive the morning of the following business day. For noncritical service requests, a service technician will arrive by the end of the following business day.
9x5 next business day	A service technician is scheduled to arrive at your customer's location on the business day after we receive your call, following remote problem determination. We provide service from 8:00 a.m. to 5:00 p.m. in the customer's local time zone, Monday through Friday, excluding IBM holidays.

In general, the types of IBM ServicePacs are as follows:

- Warranty and maintenance service upgrades
  - One, 2, 3, 4, or 5 years of 9x5 or 24x7 service coverage
  - Onsite repair from next business day to 4 or 2 hours
  - One or 2 years of warranty extension
- Remote technical support services
  - One or three years with 24x7 coverage (severity 1) or 9x5/next business day for all severities
  - Installation and startup support for System x® servers
  - Remote technical support for System x servers
  - Software support - Support Line
    - Microsoft or Linux software
    - VMware
    - IBM Systems Director

## Regulatory compliance

The server conforms to the following international standards:

- FCC - Verified to comply with Part 15 of the FCC Rules, Class A
- Canada ICES-003, issue 4, Class A
- UL/IEC 60950-1
- CSA C22.2 No. 60950-1-03
- Japan VCCI, Class A
- Australia/New Zealand AS/NZS CISPR 22:2006, Class A
- IEC 60950-1 (CB Certificate and CB Test Report)
- Taiwan BSMI CNS13438, Class A;
- Korea KN22, Class A; KN24
- Russia/GOST ME01, IEC-60950-1, GOST R 51318.22-99, GOST R 51318.24-99, GOST R 51317.3.2-2006, GOST R 51317.3.3-99,
- IEC 60950-1 (CB Certificate and CB Test Report)
- CE Mark (EN55022 Class A, EN60950-1, EN55024, EN61000-3-2, EN61000-3-3)
- CISPR 22, Class A

## External disk storage expansion

HS22V supports external SAS attachments to the EXP2412 and EXP2424 with MR10ie installed in blade server and SAS Cconnectivity Modules (one or two) installed in chassis. SAS Connectivity Module is listed in the following table.

Table 16. SAS Connectivity Modules

Part number	Description	Maximum quantity supported per one chassis
39Y9195	SAS Connectivity Module	2

The external disk storage expansion enclosures listed in the following table are supported with HS22V.

Table 17. External storage expansion enclosures

Part number	Description	Maximum quantity supported per one blade server
174712X	IBM System Storage EXP2512 Express	1
174724X	IBM System Storage EXP2524 Express	1

The hard disk drives listed in the following table are supported with external expansion enclosures.

Table 18. Hard drive options for external expansion enclosures

Part number	Description	Maximum quantity supported per one enclosure
EXP2512 SAS 3.5" Hard Drives		
49Y1899	300GB 15,000 rpm 6Gb SAS 3.5" HDD	12
49Y1900	450GB 15,000 rpm 6Gb SAS 3.5" HDD	12
49Y1901	600GB 15,000 rpm 6Gb SAS 3.5" HDD	12
49Y1903	1TB 7,200 rpm 6Gb SAS NL 3.5" HDD	12
49Y1902	2TB 7,200 rpm 6Gb SAS NL 3.5" HDD	12
90Y8720	3TB 7,200 rpm 6Gb SAS NL 3.5" HDD	12
EXP2524 SAS 2.5" Hard Drives		
49Y1895	300GB 10,000 rpm 6Gb SAS 2.5" HDD	24
49Y1896	146GB 15,000 rpm 6Gb SAS 2.5" HDD	24
49Y1898	500GB 7,200 rpm 6Gb SAS NL 2.5" HDD	24
81Y9596	600GB 10,000 rpm 6Gb SAS 2.5" HDD	24
81Y9944	300GB 15,000 rpm 6Gb SAS 2.5" HDD	24
81Y9948	900GB 10,000 rpm 6Gb SAS 2.5" HDD	24
81Y9948	900GB 10,000 rpm 6Gb SAS 2.5" HDD	24
EXP2524 SAS 2.5" SSDs		
81Y9956	200GB 2.5" SAS SSD	24
81Y9960	400GB 2.5" SAS SSD	24

The RAID controllers listed in the following table are supported with external expansion enclosures.

Table 19. RAID controllers for external storage expansion enclosures

Part number	Description	Maximum quantity supported
46C7167	ServeRAID-MR10ie (CIOv) Controller with battery	1
-	ServeRAID-MR10ie (CIOv) Controller without battery	1

**Note:** If the ServeRAID MR10ie is installed, the battery is installed in DIMM slot 7. Therefore DIMM slot 7 cannot be used for memory. This will limit the total amount of memory that will be able to be installed.

The ServeRAID MR10ie Controller has the following specifications:

- Two SAS ports routed internally to the chassis I/O bays 3 and 4
- Supports RAID levels 0, 1, 5, 6, 10, 50, and 60
- Provides 256 MB of ECC DDR-2 battery-backed cache
- 3 Gbps throughput per port
- PCI Express 1.0 x4 host interface
- Based on the LSI 1078 controller
- Supports up to 26 disk drives.
- Support for external disk drives with HS22V
- Supports connectivity to the EXP2412 and EXP2424 storage expansion enclosures

The external SAS cables listed in the following table are supported with external expansion enclosures and MR10ie RAID controllers connected to SAS Connectivity Modules.

Table 20. External SAS cables for external storage expansion enclosures

Part number	Description	Maximum quantity supported per enclosure
39R6531	IBM 3 m SAS Cable	1
39R6529	IBM 1 m SAS Cable	1

## External disk storage systems

The following table lists the external storage systems that are supported by the server and can be ordered through System x sales channel. The server may support other IBM disk systems that are not listed in this table. Refer to IBM System Storage Interoperability Center for further information, <http://www.ibm.com/systems/support/storage/ssic>.

Table 21. External disk storage systems

Part number	Description
1746A2D	IBM System Storage DS3512 Express Dual Controller Storage System
1746A2S	IBM System Storage DS3512 Express Single Controller Storage System
1746A4D	IBM System Storage DS3524 Express Dual Controller Storage System
1746A4S	IBM System Storage DS3524 Express Single Controller Storage System
181494H	IBM System Storage DS3950 Model 94
181498H	IBM System Storage DS3950 Model 98
181492H	IBM System Storage EXP395 Expansion Unit
1746A2E	IBM System Storage EXP3512 Express Storage™ Expansion Unit
1746A4E	IBM System Storage EXP3524 Express Storage Expansion Unit

For more information, see the list of IBM Redbooks Product Guides in the Storage Systems category: <http://www.redbooks.ibm.com/portals/systemx?Open&page=pg&cat=externalstorage>

## External backup units

The server supports the external backup attachment options listed in the following table.

Table 22. External backup options (Part 1)

Part number	Description
External tape expansion enclosures for internal tape drives	
87651UX	1U Tape Drive Enclosure
8767HHX	Half High Tape Drive Enclosure
87651NX	1U Tape Drive Enclosure (with Nema 5-15P LineCord)
8767HNX	Half High Tape Drive Enclosure (with Nema 5-15P LineCord)
Tape enclosure adapters (with cables)	
44E8869	USB Enclosure Adapter Kit
40K2599	SAS Enclosure Adapter Kit
Internal backup drives supported by external tape enclosures	
46C5364	IBM RDX Removable Hard Disk Storage System - Internal USB 160 GB Bundle
46C5387	IBM RDX Removable Hard Disk Storage System - Internal USB 320 GB Bundle
46C5388	IBM RDX Removable Hard Disk Storage System - Internal USB 500 GB Bundle
46C5399	IBM DDS Generation 5 USB Tape Drive
39M5636	IBM DDS Generation 6 USB Tape Drive
43W8478	IBM Half High LTO Gen 3 SAS Tape Drive
44E8895	IBM Half High LTO Gen 4 SAS Tape Drive
49Y9898	IBM Half High LTO Gen 5 Internal SAS Tape Drive

Table 22. External backup options (Part 2)

Part number	Description
External backup units*	
362516X	IBM RDX Removable Hard Disk Storage System - External USB 160 GB Bundle
362532X	IBM RDX Removable Hard Disk Storage System - External USB 320 GB Bundle
362550X	IBM RDX Removable Hard Disk Storage System - External USB 500 GB Bundle
3628L3X	IBM Half High LTO Gen 3 External SAS Tape Drive (with US line cord)
3628L4X	IBM Half High LTO Gen 4 External SAS Tape Drive (with US line cord)
3628L5X	IBM Half High LTO Gen 5 External SAS Tape Drive (with US line cord)
3628N3X	IBM Half High LTO Gen 3 External SAS Tape Drive (without line cord)
3628N4X	IBM Half High LTO Gen 4 External SAS Tape Drive (without line cord)
3628N5X	IBM Half High LTO Gen 5 External SAS Tape Drive (without line cord)
3580S3V	System Storage TS2230 Tape Drive Express Model H3V
3580S4V	System Storage TS2240 Tape Drive Express Model H4V
3580S5E	System Storage TS2250 Tape Drive Express Model H5S
3580S5X	System Storage TS2350 Tape Drive Express Model S53
3572S4R	TS2900 Tape Library with LTO4 HH SAS drive & rack mount kit
3572S5R	TS2900 Tape Library with LTO5 HH SAS drive & rack mount kit
35732UL	TS3100 Tape Library Model L2U Driveless
35734UL	TS3200 Tape Library Model L4U Driveless
46X2682†	LTO Ultrium 5 Fibre Channel Drive
46X2683†	LTO Ultrium 5 SAS Drive Sled
46X2684†	LTO Ultrium 5 Half High Fibre Drive Sled
46X2685†	LTO Ultrium 5 Half High SAS Drive Sled
46X6912†	LTO Ultrium 4 Half High Fibre Channel Drive Sled
46X7117†	LTO Ultrium 4 Half High SAS DriveV2 Sled
46X7122†	LTO Ultrium 3 Half High SAS DriveV2 Sled

\* Note: The external tape drives listed can be ordered through System x sales channel. Server may support other IBM tape drives that are not listed in this table. Refer to IBM System Storage Interoperability Center for further information.

† Note: These part numbers are the tape drives options for 35732UL and 35734UL.

For more information, see the list of IBM Redbooks Product Guides in the Backup units category:  
<http://www.redbooks.ibm.com/portals/systemx?Open&page=pg&cat=tape>

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## Related publications and links

For more information see the following resources:

- IBM BladeCenter HS22V product page  
<http://ibm.com/systems/bladecenter/hardware/servers/hs22v>
- IBM BladeCenter Information Center  
<http://publib.boulder.ibm.com/infocenter/bladectr/documentation>
- IBM BladeCenter HS22V Installation and User's Guide  
<http://ibm.com/support/entry/portal/docdisplay?Indocid=MIGR-5083318>
- IBM BladeCenter HS22V Problem Determination and Service Guide  
<http://ibm.com/support/entry/portal/docdisplay?Indocid=MIGR-5083319>
- ServerProven hardware compatibility page for the HS22V  
<http://ibm.com/systems/info/x86servers/serverproven/compat/us/blade/7871.html>
- ServerProven compatibility page for operating system support  
<http://ibm.com/systems/info/x86servers/serverproven/compat/us/nos/ematrix.shtml>
- BladeCenter Interoperability Guide  
<http://www.redbooks.ibm.com/big>
- IBM Redbooks Product Guides for IBM BladeCenter servers and options  
<http://www.redbooks.ibm.com/Redbooks.nsf/portals/BladeCenter?Open&page=pgbycat>
- Configuration and Option Guide  
<http://www.ibm.com/systems/xbc/cog/>
- xREF - IBM x86 Server Reference  
<http://www.redbooks.ibm.com/xref>
- IBM System x Support Portal  
<http://ibm.com/support/entry/portal/>

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